Freshwater Swamp Forest in Singapore, with Particular Reference to That Found Around the Nee Soon Firing Ranges

I.M. Turner¹, Boo Chih Min¹, Wong Yew Kwan², Chew Ping Ting³ and Ali bin Ibrahim³

- School of Biological Sciences, National University of Singapore, Singapore 119260
- 2. 89 Soo Chow Garden Road, Singapore 575526
- 3. National Parks Board, Singapore Botanic Gardens, Singapore 259569

Abstract

The freshwater swamp forest found around the firing ranges at Nee Soon is the last remaining area of this forest formation in Singapore. The vascular plant flora of freshwater swamp forest in Singapore is reviewed, with particular reference to the Nee Soon forest. Some preliminary soil, water and foliar analyses indicate that the swamp forest at Nee Soon may have considerably higher amounts of phosphorus available to the vegetation than the dryland forest of Bukit Timah Nature Reserve. Nitrogen and potassium availabilities appear to be similar at the two sites. The Nee Soon swamp forest is an extremely important site for Singapore's native biota and should receive the highest priority for conservation.

Introduction

One of the least well-known of the forest formations of West Malaysia is freshwater swamp forest. So named to distinguish it from the saltwater mangrove swamps, it is a forest type of wet, often seasonally flooded, lowland areas (Whitmore 1975). The only work of any note specifically concerning freshwater swamp in this region is Corner's (1978) account of his studies, which were mostly floristic in nature, of these forests in southeast Johore and Singapore. Corlett (1991) has estimated that approximately 5% of Singapore was covered in freshwater swamp before the major forest clearance of the nineteenth century began. The only remaining area of swamp forest in Singapore today is to be found around the Nee Soon Firing Ranges in the Central Catchment Nature Reserve (Fig. 1). The fauna of the Nee Soon forest and surrounding areas has been outlined by Ng and Lim (1992). Botanically, this area has never been studied closely, and it seems timely to consolidate our current knowledge of the forest into one publication.

The Nee Soon Swamp Forest

Swamp forest occurs in low-lying areas where slow-flowing streams drain shallow valleys. The ground becomes saturated with the water table close to the soil surface and there are often periods of flooding. Such swamps probably occurred historically in the upper reaches of all the rivers in Singapore (Corlett 1991). Corner (1978) made detailed studies of the flora and forest structure of the swamp forest near Mandai Road, which is now submerged beneath Upper Seletar Reservoir, and in Jurong. Industrial and housing development have totally destroyed the Jurong swamps. This leaves the Nee Soon swamp as the last remnant of the forest formation in Singapore. It has probably survived because of the Firing Ranges, which lack

baffling walls or banks, making the surrounding area dangerous to the public and unsuitable for any form of development. The approximate extent of the swamp forest is shown in Figure 1. This has been delineated from data collected by a number of field researchers, particularly D.H. Murphy who has mapped many of the main streams of the area. It is estimated that the swamp forest covers about 87 ha, though much of this has been disturbed quite heavily at various times in the past. There is concern that changes in the drainage regime of the forest may be causing excessive soil erosion along some of the streams and causing the death of the larger trees in certain areas (D.H. Murphy pers. comm.).

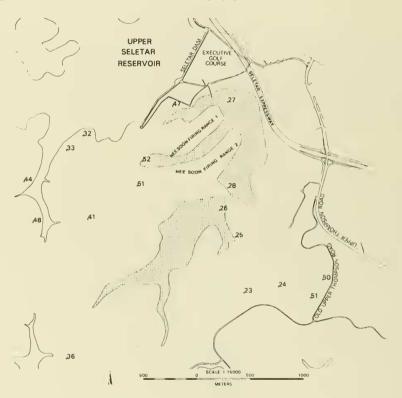


Figure 1. Map showing the location of the Nee Soon Freshwater Swamp Forest, Singapore. The stippled area indicates the approximate extent of the swamp forest.

Floristics

Appendix 1 gives a list of vascular plant species recorded from swamp forest in Singapore. It is compiled from the list given by Corner (1978) for his plots at Jurong and Mandai Road, specimens in the herbarium of the Singapore Botanic Gardens (SING) where Nee Soon or Chan Chu Kang are given as collecting localities, recent collections from the Nature Reserves mostly as outlined by Turner *et al.* (1994) and the results of the forest survey of Wong *et al.* (1994). Clearly, the flora of the swamp forest is rich, with more than 700 species having been recorded from this vegetation type in Singapore.

Vegetation Structure and Physiognomy

The forest at Nee Soon has an appearance similar to that outlined for freshwater swamp forest in other localities by Corner (1978). The ground is saturated with frequent small streams and pools of water. Many of the trees exhibit the prolific development of large stilt roots and/or abundant pneumatophores of various descriptions, that Corner illustrates profusely in his book. In apparently primary areas, the trees can reach large size, with heights of 40 m or more being recorded (Hill 1977).

During a survey of the forest communities of the Central Catchment Nature Reserve (Wong et al. 1994) three 0.2 ha plots were enumerated in the swamp forest. The location of plots 26, 27 and 28 are given in Figure 1. The floristic composition for trees of greater than 30 cm girth at breast height (1.3 m) in the three plots is given in Table 1. The composition of the three plots was different from the plots surveyed in the primary forest on dryland sites (Turner et al. 1996b). Important species in terms of basal area were Pometia pinnata, Palaquium xanthochymum, Mangifera griffithii, Gluta wallichii and Strombosia ceylanica. Corner (1978) reported these to be abundant in his Mandai Road plots, indicating a strong similarity in the forest between the two sites, which is not surprising given their propinquity.

Table 1 Composition of the forest community (> 30 cm gbh) in three 0.2 ha plots in the Nee Soon swamp forest. n = number of individuals of each species, ba = total basal area (cm2). Species are in descending order of total basal area summed for the three plots. Some individuals could not be identified and are referred to by code numbers.

			р	lot		
	26		27		28	
species	n	ba	n	ba	п	ba
Pometia pinnata	6	10599	5	10357	2	6531
Palaquium xanthochymum	5	17983	2	1866	2	7128
Mangifera griffithii	5	8853	7	4649	6	6160
Gluta wallichii	5	6466	3	3082	5	6362
Strombosia ceylanica	10	8104	3	1017	11	5295
Z 19					1	13440
Pentace triptera	3	7322				
Z 03			1	6237		
Palaquium rostratum	2	3107	1	2114		
Santiria rubiginosa	5	4955				
Mussaendopsis beccariana	4	1406	5	1514	4	1912
Gonystylus maingayi					2	4494
Polyalthia glauca	5	1635	6	2521		
Campnosperma auriculatum			1	3677		
Bhesa paniculata	2	1571	1	1559	4	484
Lophopetalum multinervium	1	232	4	2982		
Calophyllum teysmannii					2	3199
U 11			1	3182		
Xanthophyllum ellipticum			2	2750		
Gymnacranthera farquhariana	4	1656	1	447	2	604

Vatica ridleyana				pl	lot		
Vatica ridleyana 3 735 2 1758 Gama mode/pana 3 2060 1 215 Chanostachys amentacea 3 2060 1 2192 Chanostachys amentacea 3 2067 Myristica cinnamomea 3 2027 Myristica clipifica 1 72 1 588 2 1353 Xanthophyllim affine 3 758 6 1174 Carallia brachiata 2 1422 1 207 1 1999 Macaranga conifera 1 1790 Thorspieldia polyspherula 2 558 4 1209 Triommamalaccensis 2 376 1 1283 Scaphium macropodum 1 1559 Triommamalaccensis 2 376 1 1515 Xylopia malayana 1 733 2 2 736 Thorspieldia permenta 1 1450 Thorspieldia permenta 1 1450 Thorspieldia permenta 1 1450 Thorspieldia permenta 1 1263 Thorspieldia permenta		26				28	
Ganua motleyana	Vatica ridlevana		735				1758
Ochanostachys amentacea 1 2192 Sandoricum beccarianum 1 2166 Myristica culmamomea 3 2027 Myristica elliptica 1 72 1 588 2 1353 Xanthophyllum affine 3 758 6 1174 Carallia brachitata 2 1422 1 207 1 1999 Macaranga conifera 1 1790 Horspieldia polyspherula 2 558 4 1209 Triomma malaccensis 2 376 1 1283 Scuphium macropodum 1 1559 Triomma malaccensis 2 376 1 1515 Xylopia malayana 1 733 2 736 Tistopia malayana 1 733 2 736 Tistopia malayana 1 718 2 692 Jackiopsis ornata 1 1450 Tistopia malayana 1 1888 2 692 Jackiopsis ornata 1 1263 Alseodaphne bancana 1 828 2 382 Sterculia ametrophylla 1 1164 Tistopia malayana 1 241 3 740 2 1944 Z09 1 1146 Tistopia malayana 1 1146 Tistopia malayanatum 1 115 1 116 Tistopia malayanatum 1 116 Tistopia malayanatum 1 116 Tistopia malayanatum 1 116 Tistopia malayanatu	· ·		2060	1	215		
Sandoricum beccariamum 1 2166							
Myristica clinamomea 1 72 1 588 2 1353 Myristica elliptica 1 72 1 588 2 1353 Xanthophylluna affine 3 758 6 1117 Carallia brachiata 2 1422 1 207 1 199 Macaranga conifera 1 1790 1 199 Mastonia angustiloba 1 1790 1 199 Horsfieldia polyspherula 2 558 4 1209 1 Triomma malaccersis 2 376 1 1283 Scaphium macropodum 1 1559 1 1515 Artocarpus kemando 1 733 2 736 1 1283 Scaphium manaccerisa 1 1450 1 1515 3 2 936 2 366 2 362 362 362 362 362 362 362 382 382 382 382				•	-1,7	1	2166
Myristica elliptica							
Xanthophyllum affine	•	1	72	1	588		
Carallia brachiata 2 1422 1 207 1 199 Macaranga conifera 1 1790 2 1811 Alstonia angustiloba 1 1790 1 1811 Horsfieldia polyspherula 2 558 4 1209 1 Triomma malaccensis 2 376 1 1283 Scaphium macropodum 1 1559 1 1515 Artocarpus kemando 1 1450 2 736 Eugenia cerina 1 1450 1 1386 2 692 Jackiopsis ornata 1 1450 1 1386 2 692 Jackiopsis ornata 1 1450 1 1384 1 1386 Lithocarpus bennettii 1 2 1384 1 1196 2 382 Sterculia cordata 1 146 2 263 3 832 Magnolia candollii 1 241 3 740 </td <td></td> <td></td> <td></td> <td>•</td> <td>500</td> <td></td> <td></td>				•	500		
Macaranga conifera 2 1811 Alstonia angustiloba 1 1790 Horsfieldia polyspherula 2 558 4 1209 Triomma malaccensis 2 376 1 1283 Scaphiummacropodum 1 1559 1 1515 Artocarpus kemando 1 733 2 736 Eugenia cerina 1 1450 1 1386 Diospyros maingayi 1 718 2 692 Jackiopsis ornata 1 1828 2 692 Jackiopsis ornata 1 1263				1	207		
Alstonia angustiloba		~	1-722	1	207		
Horsfieldia polyspherula 2 558				1	1790	_	1011
Trionma malaccensis 2 376		2	558				
Scaphium macropodum		2	330			1	1283
Ariocarpus kemando Xylopia malayana 1 733 2 736 Eugenia cerina Diospyros maingayi 1 718 2 692 Jackiopsis ornata Lithocarpus bennettii 2 1384 Lithocarpus bennettii 3 2 1384 Sterculia macrophylla Alseodaphne bancana 1 828 2 382 Sterculia cordata Magnolia candollii 1 241 3 740 2 194 Z 09 1 1146 Campnosperma squamatum Aquilaria malaccensis 1 1052 Tristaniopsis merguensis Archidendron ellipticum Horsfieldia sucosa Aglaia rubiginosa Z 17 Bluneodendron tokbrai Pellacalyx axillaris Horsfieldia crassifolia Xylopia fusca Alangium nobile Xanthophyllum obscurum Knena commuis 1 509 1 176 Osmelia philippinensis 3 471 1 127 1 72 Litsea erectinervia 8 509 Carcinia parvifolia 1 140 2 454 Knema curtisii Lophopetalum wightiamum Garcinia parvifolia 1 140 2 454 Klibatalia maingayi 1 575 Knema conferta Mastixia trichotoma Cryptocarya ferreea MYRISTICACEAEI Beilschmiedia kunstleri 1 447 Horsfieldia kunstleri 1 446 Beilschmiedia kunstleri 1 447 Horsfieldia maingayi 1 575 Knema conferta 1 197 3 366 Bright Additional 1 446 Beilschmiedia kunstleri 1 446 Beilschmiedia kunstleri 1 446 Beilschmiedia kunstleri 1 447						1	1203
Xylopia malayana	-			1	1557	1	1515
Eugenia cerina		1	733				
Diospyros maingayi						2	730
Jackiopsis ornata						2	602
Lithocarpus bennetiti 2 1384 Sterculia macrophylla 1 1263 Alseodaphne bancana 1 828 2 382 Sterculia cordata 1 1191 1191 Magnolia candollii 1 241 3 740 2 194 Z 09 1 1146 116 1191 11146 11144 11444		1	/10				
Sterculia macrophylla				2	1204	1	1300
Alseodaphne bancana	•						
Sterculia cordata		1	020	1	1205	2	202
Magnolia candollii 1 241 3 740 2 194 Z 09 1 1146	<u> </u>	1	020				
Z.09		1	241	2	740		
Campnosperma squamatum 2 263 3 832 Aquilaria malaccensis 1 1052 1016 Tristaniopsis merguensis 1 998 1016 Archidendron ellipticum 1 998 1016 Horsfieldia sucosa 2 993 2016 Aglaia rubiginosa 2 985 2016 Z 17 2 926 30165 Blumeodendron tokbrai 3 1165 Pellacalyx axillaris 2 409 1 447 Horsfieldia crassifolia 1 796 1 796 Aylopia fusca 1 115 1 616 Xanthophyllum obscurum 1 115 1 616 Xanthophyllum obscurum 1 176 1 796 Osmelia philippinensis 3 471 1 127 1 72 Litsea erectinervia 2 320 2 328 Memecylon edule 1 644 1 644 Lophopetalum wightiamun 1 602 4 <td< td=""><td>_</td><td></td><td></td><td>3</td><td>740</td><td>2</td><td>194</td></td<>	_			3	740	2	194
Aquilaria malaccensis 1 1052 Tristaniopsis merguensis 1 1016 Archidendron ellipticum 1 998 Horsfieldia sucosa 2 993 Aglaia rubiginosa 2 985 Z 17 2 926 Blumeodendron tokbrai 3 1165 Pellacalyx axillaris 2 409 1 447 Horsfieldia crassifolia 1 796 1 796 Alangiun nobile 1 115 1 616 Xanthophyllum obscurun 1 688 Knema commusis 1 509 1 176 Osmelia philippinensis 3 471 1 127 1 72 Litsea erectinervia 2 320 2 328 Memecylonedule 1 644 1 644 Knema curtisii 1 602 4 2982 Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 1 535 Mastixia t		1	1140	2	262	2	022
Tristaniopsis merguensis 1 1016 Archidendron ellipticum 1 998 Horsfieldia sucosa 2 993 Aglaia rubiginosa 2 985 Z 17 2 926 Blumeodendron tokbrai 3 1165 Pellacalyx axillaris 2 409 1 447 Horsfieldia crassifolia 1 796 1 796 Xylopia fusca 1 115 1 616 Xanthophyllum obscurum 1 15 1 616 Xanthophyllum obscurum 1 176 72 Usea erectinervia 2 320 2 328 Memecylon edule 1 127 1 72 Lisea erectinervia 2 320 2 328 Memecylon edule 1 644 44 Knema curtisii 1 602 4 2982 Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 509 Knema conferta 1 <td></td> <td></td> <td>1052</td> <td>2</td> <td>203</td> <td>3</td> <td>832</td>			1052	2	203	3	832
Archidendron ellipticum 1 998 Horsfieldia sucosa 2 993 Aglaia rubiginosa 2 985 Z 17 2 926 Bhuneodendron tokbrai 3 1165 Pellacalyx axillaris 2 409 1 447 Horsfieldia crassifolia 1 796 1 796 Xylopia fusca 1 115 1 616 Xanthophyllum obscurum 1 1509 1 176 Osmelia philippinensis 3 471 1 127 1 72 Litsea erectinervia 2 320 2 328 Memecylon edule 1 644 1 644 Knema curtisii 1 602 4 2982 Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 1 535 Knena conferta 1 535 1 Mastixia trichotoma 2 509 509 Cryptocarya ferrea 1 97 3 <td>-</td> <td>1</td> <td>1032</td> <td></td> <td></td> <td>1</td> <td>1016</td>	-	1	1032			1	1016
Horsfieldia sucosa				1	008	1	1010
Aglaia rubiginosa 2 985							
Z 17	*						
Bhumeodendron tokbrai 3 1165 Pellacalyx axillaris 2 409 1 447 Horsfieldia crassifolia 1 796 Xylopia fiusca 1 115 1 616 Xanthophyllum obscurum 1 115 1 616 Xanthophyllum obscurum 1 509 1 176 05 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 176 05 1 172 1 72 1 172 1 72 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				2	983	2	026
Pellacalyx axillaris 2 409 1 447 Horsfieldia crassifolia 1 796 Xylopia fusca 1 150 1 616 Alangium nobile 1 115 1 616 Xanthophyllum obscurum 1 509 1 176 Osmelia philippinensis 3 471 1 127 1 72 Litsea erectinervia 2 320 2 328 Memecylon edule 1 644 Knema curtisii 1 602 4 2982 Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 1 535 Knema conferta 1 535 1 535 Mastixia trichotoma 2 509 2 7 3 366 MYRISTICACEAE1 1 400 447 447							
Horsfieldia crassifolia				2	400		
Xylopia fusca				2	409		
Alangium nobile 1 115 1 616 Xanthophyllum obscurum 1 509 1 176 Osmelia philippinensis 3 471 1 127 1 72 Litsea erectinervia 2 320 2 328 Memecylon edule 1 644 Knema curtisii 1 602 4 2982 Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 555 Knema conferta 1 535 Mastixia trichotoma 2 509 Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447							
Xanthophyllum obscurum 1 688 Knema communis 1 509 1 176 Osmelia philippinensis 3 471 1 127 1 72 Litsea erectinervia 2 320 2 328 Memecylon edule 1 644 644 644 644 Knema curtisii 1 602 4 2982 Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 575 Knema conferta 1 535 509 Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447				1	115		
Knema communis 1 509 1 176 Osmelia philippinensis 3 471 1 127 1 72 Litsea erectinervia 2 320 2 328 Memecylon edule 1 644 Knema curtisii 1 602 4 2982 Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 1 535 Knema conferta 1 535 509 Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447				1	115		
Osmelia philippinensis 3 471 1 127 1 72 Litsea erectinervia 2 320 2 328 Memecylon edule 1 644 Knema curtisii 1 602 4 2982 Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 575 Knema conferta 1 535 Mastixia trichotoma 2 509 Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447		1	500	1	176	1	880
Litsea erectinervia 2 320 2 328 Memecylon edule 1 644 Knema curtisii 1 602 4 2982 Garcinia parvifolia 1 140 2 454 44 Kibatalia maingayi 1 575<							70
Memecylon edule 1 644 Knema curtisii 1 644 Lophopetalun wightiamum 1 602 4 2982 Garcinia parvifolia 1 140 2 454 454 545		3	4/1				
Knema curtisii 1 644 Lophopetalun wightianum 1 602 4 2982 Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 Knema conferta 1 535 Mastixia trichotoma 2 509 Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447				2	320		
Lophopetalun wightianum 1 602 4 2982 Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 Knema conferta 1 535 Mastixia trichotoma 2 509 Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447							
Garcinia parvifolia 1 140 2 454 Kibatalia maingayi 1 575 Knema conferta 1 535 Mastixia trichotoma 2 509 Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447					600		
Kibatalia maingayi 1 575 Knema conferta 1 535 Mastixia trichotoma 2 509 Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447			1.10			4	2982
Knema conferta 1 535 Mastixia trichotoma 2 509 Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447				2	454		
Mastixia trichotoma 2 509 Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447		I	5/5	1	535		
Cryptocarya ferrea 1 97 3 366 MYRISTICACEAE1 1 460 Beilschmiedia kunstleri 1 447	•						
MYRISTICACEAE11460Beilschmiedia kunstleri1447						2	266
Beilschmiedia kunstleri 1 447				I	9/		
Castanopsis nephelioides 1 436							
	Castanopsis nephelioides					1	436

26		plot					
Z12		26				28	
U 12	Z12	1	215			1	215
U 12	Knema laurma	1	412				
Macaranga triloba	U12					1	412
Lisse a robusta	Macaranga triloba	1	72	2	159	1	
Prunus polystachya				2	361		
Prunus polystachya	Myristica lowiana	1	357				
Parishia maingayi		1					
Dysoxylum densiflorum		1					
Shorea platycarpa 1 306		1					
Baccaurea minor 1 296				1	306		
Calophyllum dispar						1	296
Calophyllum dispar 1	Knema hookeriana			1	286		
Kibara coriacea				1			
Rinema latericia 2		1	277				
Baccaurea parvifolia		2					
Diospyros lanceifolia				1	258		
Phoebe grandis				1			
Mangifera foenda						1	241
Z 1				1	232		
Aglaia maingayi		1	232				
Baccaurea racemosa 1 215 215 3 215 3 3 3 3 3 3 3 3 3				1	223		
Z 14		1	215				
Carcuna eugeniifolia	Z 1-			1	215		
Carcinia eugenii folia	Gneum gnemon			1			
Aglaia odoratissima 1 207 Pternandra coerulescens 1 207 Pimelodendron griffishiu 1 199 Z 10 1 191 Z 18 1 191 Baccaurea hookeri 1 183 Shorea macroptera 1 183 Neosconechinia kingti 1 176 Aporusa penangensis 1 176 Myristica iners 1 176 Cyathocalyx ramuliflorus 1 168 Shorea ovalus 1 154 Sarcotheca griffithii 1 154 Diospyros pilosanthera 2 153 Melanochyla caesia 1 72 1 81 Knema malayana 1 147 140 Z15 1 140 140 Calophyllum tetrapterum 1 134 134 Eugenia papillosa 1 134 134 Garcinia nervosa 1 115 1 109 Z13 1 103 1 103 Lansi						1	215
Piermandra coerulescens 1				1	207		
Carcinia forbesii				1	207		
Carcinia forbesii	Pimelodendron griffahu			1	199		
Z 10				1	199		
Baccaurea hookeri		1	191				
Shorea macroptera Neosconechinia kingii Aponusa penangensis 1 176 Myristica iners Cyathocalyx ramuliflonus 1 168 Shorea ovalus Shorea ovalus Sarcotheca griffithii 1 154 Diospyros pilosanthera Diospyros pilosanthera 1 172 Melanochyla caesia 1 72 1 81 Knema malayana 1 147 Z15 Calophyllum tetrapterum 1 134 Eugenia papillosa Gynotroches axillaris Garcinia nervosa 1 115 Horsfieldia wallichii Z13 Lansium domesticum 1 103 Lansium domesticum 1 103 Lansium domesticum	Z 18					1	191
Neoscorechinia kingti 1 176 Aponusa penangensis 1 176 Myristica iners 1 168 Shorea ovalis 1 154 Sarcotheca griffithii 1 154 Diospyros pilosanthera 2 153 Melanochyla caesia 1 72 1 81 Knema malayana 1 147 2 1 140 Z 15 1 140 140 1 140 Calophyllum tetraptenum 1 134 134 134 134 134 Gynotroches axillaris 1 115 1 109 109 2 13 1 103 1 109 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 103 1 <t< td=""><td>Baccaurea hookeri</td><td>1</td><td>183</td><td></td><td></td><td></td><td></td></t<>	Baccaurea hookeri	1	183				
Aponusa penangensis 1 176 Myristica iners 1 176 Cyathocalyx ramuliflorus 1 168 Shorea ovalus 1 154 Sarcotheca griffithii 1 154 Diospyros pilosanthera 2 153 Melanochyla caesia 1 72 1 81 Knema malayana 1 147 147 Z 15 1 140 140 Calophyllum tetrapterum 1 134 134 Eugenia papillosa 1 134 134 Gynotroches axillaris 1 134 Garcinia nervosa 1 115 Horsfieldia wallichii 1 103 Lansium domesticum 1 103	Shorea macroptera			1	183		
Myristica iners 1 176 Cyathocalyx ramuliflorus 1 168 Shorea ovalis 1 154 Sarcotheca griffithii 1 154 Diospyros pilosanthera 2 153 Melanochyla caesia 1 72 1 81 Knema malayana 1 147 147 Z 15 1 140 140 Calophyllum tetrapterum 1 134 134 Eugenia papillosa 1 134 134 Gynotroches axillaris 1 134 Garcinia nervosa 1 115 Horsfieldia wallichii 1 103 Lansium domesticum 1 103	Neoscortechinia kingti					1	176
Cyathocalyx ramuliflorus Shorea ovalis Sarcotheca griffithii Diospyros pilosanthera Melanochyla caesia I 72 I 81 Knema malayana I 134 Z 15 Calophyllum tetraptenum I 134 Eugenia papillosa Gynotroches axillaris Garcinia nervosa Horsfieldia wallichii Z 13 Lansium domesticum I 168 1 154 S 1 154 S 1 140 I 147 I 140 I 134 I 134 I 134 I 103 Lansium domesticum I 103	Aponisa penangensis	1	176				
Shorea ovalus	Myristica iners			1	176		
Sarcotheca griffithii 1 154 Diospyros pilosanthera 2 153 Melanochyla caesia 1 72 1 81 Knema malayana 1 147 1 140 Z 15 1 140 1 140 Calophyllum tetrapterum 1 134 1 134 Eugenia papillosa 1 134 1 134 Gynotroches axillaris 1 115 1 109 Horsfieldia wallichii 1 103 1 103 Larsium domesticum 1 103 1 103	Cyathocalyx ramuliflorus	1	168				
Diospyros pilosanthera 2 153 Melanochyla caesia 1 72 1 81 Knema malayana 1 147 147 Z 15 1 140 1 140 Calophyllum tetrapterum 1 134 134 134 Eugenia papillosa 1 134 134 134 Gynotroches axillaris 1 115 134 Garcinia nervosa 1 115 109 Z 13 1 103 103 Lansium domesticum 1 103				1	154		
Melanochyla caesia 1 72 1 81 Knema malayana 1 147 Z 15 1 140 Calophyllum tetrapterum 1 134 Eugenia papillosa 1 134 Gynotroches axillaris 1 134 Garcinia nervosa 1 115 Horsfieldia wallichii 1 103 Z 13 1 103 Larsium domesticum 1 103		1	154				
Knema malayana 1 147 Z 15 1 140 Calophyllum tetrapterum 1 134 Eugenia papillosa 1 134 Gynotroches axillaris 1 134 Garcinia nervosa 1 115 Horsfieldia wallichii 1 109 Z 13 1 103 Lansium domesticum 1 103						2	153
Z 15	Melanochyla caesia	1	7.2	1	81		
Calophyllum tetrapterum 1 134 Eugenia papillosa 1 134 Gynotroches axillaris 1 135 Garcinia nervosa 1 115 Horsfieldia wallichii 1 103 Lansium domesticum 1 103				1	147		
Eugenia papillosa Gynotroches axillaris Garcinia nervosa 1 115 Horsfieldia wallichii 1 103 Lansium domesticum 1 134 1 134 1 105 1 109						1	140
Gynotroches axillaris Garcinia nervosa 1 115 Horsfieldia wallichii 1 109 Z 13 1 103 Lansium domesticum 1 103		1	134				
Garcinia nervosa 1 115 Horsfieldia wallichii 1 109 Z 13 1 103 Lansium domesticum 1 103				1	134		
Horsfieldia wallichii 1 109 Z 13 1 103 Lansium domesticum 1 103						1	134
Z 13 1 103 Lansium domesticium 1 103		1	115				
Lansium domesticum: 1 103						1	109
Pyrenaria acuminata 1 103							
	Pyrenana acuminata			1	103		

		plot				
	26		27		28	
Buchanania sessilifolia	1	97				
Z 16					1	97
Elaeocarpus petiolatus			1	92		
Lithocarpus sundaicus			1	92		
Eurya acuminata			1	92		
Sterculia rubiginosa			1	87		
Gymnacranthera bancana			1	87		
Microcos blattifolia			1	81		
Bhesa robusta					1	81
Stemonoporus scorpioides					1	81
Memecylon lilacinum			1	81		
Diplospora malaccensis			1	81		
Dysoxylum excelsum			1	72		
Ardisia colorata	1	72				
Symplocos fasciculatus	1	72				
Xanthophyllum vitellinum	1	72				
TOTAL (ba in m²)	108	9.18	107	6.64	121	8.20

The terrestrial herbs have been surveyed also in these three plots (Turner *et al.* 1996a). Twenty species were recorded (Table 2), with only *Aglaonema nebulosum* and *Labisia pumila* being found in all three plots. The Araceae proved to be particularly diverse.

Table 2Terrestrial herbaceous species recorded from the three 0.2 ha plots enumerated in Nee Soon swamp forest. + indicates presence.

species	plot	plot	plot
	26	27	28
Aglaonema nebulosian	+	+	+
Aglaonemanitidum	+	+	
Alocasia denudata			+
Amischotolype gracilis		+	+
Cryptocoryne griffithii		+	+
Cyrtospermamerkusii		+	
Homalomena sp. 1		+	
Hontalomena sp. 2		+	
Labisia puniila	+	+	+
Lecanorchis malaccensis		+	
Leptaspis urceolata		+	
Lindsaea doryophora		+	
Mapania cuspidata	+		
Mapania squamata		+	
Ophiorrhiza singaporensis			+
Peliosanthes teta ssp. humilis		+	
Plocoglottis javanica		+	
Schismatoglottis wallichii	+		
Syngranınıa alismifolia	+		+
Trichonunes obscurion			+
Total number of species	6	12	10

Soil

The soil in freshwater swamp forest is generally rich in organic matter, presumably because the anaerobic nature of the waterlogged conditions reduces the rate of decomposition. However, this process has not proceeded far enough to develop soils of high enough organic matter content to be considered peats (generally >90% loss-on-ignition by mass). Some preliminary analyses for soil samples from Nee Soon (Table 3) showed the soil surface to have high loss-on-ignition, averaging nearly 80% and approaching 90% in places, though the values dropped rapidly below 5 cm depth to generally less than 50% loss-on-ignition. Some pH measurements showed that stream water and soil water lay in the range 4.6-5.5, with soil pH at 5 cm depth to be lower, 4.0-4.5. The concentrations of the major plant nutrients, nitrogen, phosphorus and potassium, were measured in the litter, soil and some foliar samples (shade leaves) gathered at Nee Soon (Table 4 and 5). Surprisingly, the litter generally had lower concentrations of the important elements than the top 5 cm layer of the soil. Possibly this represents the flushing of nutrients down through the soil.

The nutrient concentration data can be compared with values obtained for the coastal hill dipterocarp forest at Bukit Timah (Grubb et al. 1994). The comparison of the soil values between the two sites is difficult given the very different soil bulk densities because of the high organic matter content of the soils at Nee Soon. Bukit Timah has more acidic soil (3.7-4.0 versus 4.0-4.5) and slightly higher litter concentrations of N (12.9-14.5 versus 9.4 mg g-1), lower concentrations of P (0.21-0.23 versus 0.47 mg g⁻¹) and higher concentrations of K (2.0-5.9 versus 0.48 mg g⁻¹). The foliage samples show a similar pattern with higher mean P in the leaves at Nee Soon (1.72 versus 0.68 mg g⁻¹), but lower N (13.2 versus 17.1 mg g⁻¹) and K (8.3 versus 10.5 mg g⁻¹) concentrations. It would appear that Nee Soon probably has more phosphorus available for plant growth than Bukit Timah, but possibly slightly less nitrogen and potassium. Phosphorus appears to be the nutrient limiting the growth of non-mycorrhizal plants on Bukit Timah soil (Burslem et al. 1994), though mycorrhizal plants seem not to be responsive to P fertilization (Burslem et al. 1995). Nee Soon may, therefore, present a potentially more fertile site for plant growth, but of course the water-logged conditions are highly unfavourable to many species. This relatively high nutrient availability may be what prevents peat formation from occurring.

Table 3Analyses of soil and leaf litter from Nee Soon Swamp Forest, Singapore.

loss-on- total N total P total K ignition (mg g-1) (mg g-1) (mg g-1) (%) leaf litter sample 1 9.88 0.52 0.52 0.42 8.50 0.48 sample 2 sample 3 9.83 0.49 0.43 mean 9.40 0.47 0.48 soil (0-5 cm) sample 1 88.7 22.2 0.87 0.51 0.70 sample 2 60.8 12.8 0.52 89.6 17.5 0.87 0.64 sample 3 mean 79.7 17.5 0.81 0.56 soil (5-10 cm) 9.53 sample 1 54.8 0.84 0.72 sample 2 34.8 6.25 0.45 0.69 sample 3 47.5 7.41 0.54 1.16 mean 45.7 7.73 0.61 0.86

Table 4Foliar analyses for shade leaves from trees at Nee Soon Swamp Forest, Singapore.

species	total N	total P	total K
	(mg g-1)	(mg g-1)	(mg g-1)
Archidendron sp.	18.9	1.28	8.9
Calophyllum sp.	7.7	0.55	5.7
Desmos dasymaschala	16.2	2.86	11.0
Diospyros sp.	10.6	1.88	7.5
Litsea ridleyi	9.7	2.41	12.3
Nephelium sp.	14.2	1.95	7.1
Pternandra echinata	12.4	1.22	5.8
Strombosia ceylanica	14.3	1.16	8.3
sp. indet.	14.8	2.17	7.9
mean	13.2	1.72	8.3

Conservation

Nee Soon is now Singapore's last fragment of freshwater swamp remaining. Many species of plants and animals are now restricted to this area, hence making Nee Soon of great importance in terms of the biodiversity of Singapore. The plant list includes *Aeschynanthus wallichii*, *Bulbophyllum macranthum*, *Cystorchis variegata*, *Kopsia singapurensis*, *Luvunga crassifolia*, *Neoscortechinia kingii* and *Xylopia fusca*. Ng and Lim (1992) list many animal species restricted, in Singapore, to Nee Soon. Species found at Nee Soon are generally not found at Bukit Timah, and vice versa, so the two are the twin pillars of biodiversity in Singapore and require strict protection.

Acknowledgements

We are grateful to D.H. Murphy, H.T.W. Tan, K.S. Chua and Haji Sidek for sharing their expertise and data concerning Nee Soon swamp forest. Jeanette Ong provided valuable technical assistance in the laboratory, and Jean Yong helped in preparing the figure.

References

Burslem, D.F.R.P., Turner, I.M. & Grubb, P.J. (1994). Mineral nutrient status of coastal hill dipterocarp forest and adinandra belukar in Singapore: bioassays of nutrient limitation. *J. Trop. Ecol.* 10:579-599.

- Burslem, D.F.R.P., Turner, I.M. & Grubb, P.J. (1994). Responses to elevated nutrient supply and simulated drought among shade-tolerant tree seedlings of lowland tropical forest in Singapore. *J. Ecol.* 83:123-132.
- Corlett, R.T. (1991). Vegetation. In: Chia, L.S., A. Rahman & D.B.H. Tay (eds.). The Biophysical Environment of Singapore. Singapore University Press. 134-154.
- Corner, E.J.H. (1978). The freshwater swamp-forest of South Johore and Singapore. *Gdns' Bull., Sing., suppl.* 1:1-266.
- Grubb. P.J.. Turner. I.M. & Burslem. D.F.R.P. (1994). Mineral nutrient status of coastal hill dipterocarp forest and adinandra belukar in Singapore: analysis of soil, leaves and litter. *J. Trop. Ecol.* 10:559-577.
- Hill. R.D. (1977). The vegetation map of Singapore: A first approximation. *J. Trop. Geogr.* 45:26-33.
- Kostermans, A.J.G.H., & Bompard, J.-M. (1993). *The Mangoes*. Academic Press. London.
- Ng, P.K.L.. & Lim, K.K.P. (1992). The conservation status of the Nee Soon freshwater swamp forest of Singapore. *Aquatic Conserv.* 2:255-266.
- Turner, I.M. (1994). The taxonomy and ecology of the vascular plant flora of Singapore: a statistical analysis. *Bot. J. Linn. Soc.* 114: 215-227.
- Turner, I.M., Tan, H.T.W., Chua. K.S., & Metcalfe, D.J. (1994). Recent botanical collections from the Nature Reserves of Singapore. *Gdns' Bull.*, *Sing.* 46(2):1-36.
- Turner, I.M., Tan. H.T.W., & Chua, K.S. (1996a). Relationships between herb layer and canopy composition in a tropical rain forest successional mosaic in Singapore. *J. Trop. Ecol.* 12: 843-851.
- Turner. I.M., Wong, Y.K., Chew, P.T. & Ali bin Ibrahim (1996b). Rapid assessment of tropical rain forest successional status using aerial photographs. *Biol. Conserv.* 77: 177-183.
- Whitmore. T.C. (1975) Tropical Rain Forests of the Far East. Clarendon Press. Oxford.
- Wong, Y.K., Chew, P.T. & Ali bin Ibrahim (1994). The tree communities of the Central Catchment Nature Reserve. Singapore. *Gdns' Bull.*, *Sing.* 46(2):37-78.

APPENDIX 1

SPECIES LIST OF VASCULAR PLANTS FOR FRESHWATER SWAMP FOREST IN SINGAPORE

Species marked with an asterisk are those recorded by Corner (1978) from freshwater swamp forest in Singapore. Where taxonomic revisions have necessitated name changes, or specimens were misidentified, the name used by Corner is given in parentheses. Other species are those collected recently or known from herbarium specimens where Nee Soon swamp forest or Chan Chu Kang are given as the collecting locality. For more information regarding NRS series collections see Turner *et al.* (1994). Species recorded from the three 0.2 ha plots at Nee Soon (Wong *et al.* 1994) are marked with a dagger (†). Only forest species are included. The determination of *Mangifera* species follows Kostermans & Bompard (1993).

LYCOPODOPHYTA

Lycopodiaceae

Huperzia nummulariifolia (Blume) Jermy - Ridley s.n. (Oct 1889)

- * Huperzia phlegniaria (L.) Rothm. (Lycopodium phlegniaria) Ridley 2420 (1884)
- * Huperzia squarrosa (G. Forst.) Trevisan (Lycopodium squarrosum)

Selaginellaceae

Selaginella argentea (Wall.) Spr. - NRS1972

FILICINOPHYTA

Adiantaceae

- † Syngramma alismifolia (C. Presl) J. Sm. NRS1610
- * Taenitis blechnoides (Willd.) Sw.

Aspleniaceae

Asplenium batuense Alderw. - NRS1185

Asplenium macrophyllum Sw. - Goodenough s.n. (1890)

- * Asplenium nidus L.
- * Asplenium nitidum Sw. (Asplenium glaucophyllum)

Blechnaceae

Blechnum finlaysonianum Hook. & Grev. - Ridley 6121 (1894)

- * Blechnum orientale L.
- * Stenochlaena palustris (Burm.) Bedd. NRS1589

Cyatheaceae

- * Cyathea glabra (Blume) Copel. NRS1526
- * Cyathea latebrosa (Wall. ex Hook.) Copel. NRS1508

Davalliaceae

Davallia angustata Wall. ex Hook. & Grev. - Ridley 3599a (189?)

Dennstaedtiaceae

* Histiopteris incisa (Thunb.) J.Sm.

Lindsaea doryophora Kramer - NRS1519

* Lindsaea parasitica (Roxb. ex Griff.) Hieron. (L. scandens) - NRS0158

Dryopteridaceae

Tectaria barberi (Hook.) Copel. - Maxwell 82-71 (18 Mar 1982) Tectaria singaporeana (Wall. ex Hook. & Grev.) Copel.

Hymenophyllaceae

Trichomanes christii Copel. - NRS0867

- * Trichomanes motleyi (Bosch) Bosch
- *† Trichomanes obscurum Blume Ridley 6119 (1894)

Lomariopsidaceae

Teratophyllum aculeatum (Blume) Mett. ex Kuhn - NRS0051

* Teratophyllum ludens (Fée) Holttum - NRS0132

Polypodiaceae

* Drynaria quercifolia (L.) Sm.

Lecanopteris sinuosa (Wall. ex Hook.) Copel. - NRS0157 Microsorum punctatum (L.) Copel. - Ridley s.n. 1896

- * Platycerium coronarium (D. Koenig ex O.F. Müll.) Desv. NRS1603
- * Pyrrosia angustata (Sw.) Ching Pyrrosia longifolia (Burm.) Morton - NRS0131

Schizaeaceae

Lygodium longifolium (Willd.) Sw. - Ridley 4229 (Dec 1892) Schizaea digitata (L.) Sw. - NRS0171

Thelypteridaceae

Christella parasitica (L.) Lév. - NRS0145

* Mesophlebion chlamydophorum (Rosenst. ex C. Chr.) Holttum (Thelypteris chlamydophora) Sphaerostephanos heterocarpus (Blume) Holttum - Ridley 6120 (1894)

Vittariaceae

* Vittaria ensiformis Sw.

Woodsiaceae

Diplazium crennatoserratum (Blume) Moore - Ridley 4399 (1892)

GNETOPHYTA

Gnetaceae

- † Gnetum gnemon L.
- * Gnetum gnemonoides Brongn. NRS0781 Gnetum macrostachyum Hook.f. - NRS0196
- * Gnetuni microcarpum Blume Maxwell 82-198 (29 Jul 1982)

CONIFEROPHYTA

Podocarpaceae

* Nageia wallichiana (Presl) Kuntze

ANGIOSPERMOPHYTA

Acanthaceae

Hygrophila ringens (L.) R.Br. ex Steud. - NRS2438 Justicia vasculosa Wall. - NRS1388 Staurogyne setigera Kuntze - NRS0166

Alangiaceae

- * Alangium ebenaceum (C.B. Clarke) Harms var. tutela (Ridl.) Kochummen
- † Alangium nobile (C.B. Clarke) Harms

Anacardiaceae

- † Buchanania sessifolia Blume
- *† Campnosperma auriculatum (Blume) Hook.f.
- *† Campnosperma squamatum Ridl. NRS101
- *† Gluta wallichii (Hook.f.) Ding Hou (Melanorrhoea wallichii) Hullett 601 (8 Feb 1887)
- † Mangifera foetida Lour.
- † Mangifera griffithii Hook.f.
- * Mangifera magnifica Kochummen (Mangifera quadrifida)
- * Mangifera paludosa Kosterm. (Mangifera aff. parvifolia)
- * Melanochyla auriculata Hook.f. Ridley 3975 (1892)
- *† Melanochyla caesia (Blume) Ding Hou (Melanochyla kunstleri)
- † Parishia maingayi Hook.f.

Ancistrocladaceae

Ancistrocladus tectorius (Lour.) Merr. - NRS1523

Anisophylleaceae

* Anisophyllea disticha (Jack) Baill. - Maxwell 82-101 (7 Apr 1982)

Annonaceae

Artabotrys costatus King - NRS1358

Artabotrys suaveolens (Blume) Blume - Maxwell 82-70 (18 Mar 1982)

- *† Cyathocalyx ramuliflorus (Maingay ex Hook.f. & Thomson) Scheff.
- * Cyathostemma viridiflorum Griff. Maxwell 80-211 (28 Nov 1980)
- † Desmos dasymaschala (Blume) Saff.
- * Desmos dumosus (Roxb.) Saff. Maxwell 81-57 (1 Apr 1980)
- * Friesodielsia biglandulosa (Blume) Steenis (Oxymitra biglandulosa) Sinclair SFN40271 (1 May 1954)
- * Friesodielsia borneensis (Mig.) Steenis (Oxymitra borneensis)
- Friesodielsia glauca (Hook.f. & Thomson) Steenis (Oxymitra glauca)
 Friesodielsia latifolia (Hook.f. & Thomson) Steenis Goodenough s.n. (189?)
 Goniothalamus macrophyllus (Blume) Hook.f. & Thomson NRS1171
- * Goniothalanus ridleyi King NRS0160

- * Mezzettia parviflora Becc. (Mezzettia leptopoda)
- * Mitrella kentii (Blume) Miq. NRS0119
- * Polyalthia angustissima Ridl.
- *† Polyalthia glauca (Hassk.) Muell.
- * Polyalthia hypolenca Hook.f. & Thomson
- * Polyalthia lateriflora (Blume) King
- * Polyalthia sclerophylla Hook.f. & Thomson
- * Popowia tomentosa Maingay ex Hook.f. & Thomson (Popowia hirta)
- * Pyramidanthe prismatica (Hook.f. & Thomson) Merr. Uvaria cordata (Dunal) Alston - NRS0120
- * Uvaria leptopoda (king) R.E. Fries
- * Xylopia caudata Hook.f. & Thomson
- *† Xylopia fusca Maingay ex Hook.f. & Thomson
- *† Xylopia malayana Hook.f. & Thomson DJM100

Apocynaceae

- * Alstonia angustifolia Wall. ex A.DC.
- † Alstonia angustiloba Miq.
- * Alstonia spatulata Blume
- * Anodendron candolleanum Wight
- † Kibatalia maingavi (Hook.f.) Woodson
- * Kopsia singapurensis Ridl. NRS0126 Leuconotis griffithii Hook.f. - Ridley s.n. (1894) Leuconotis maingayi Dyer ex Hook.f. - NRS0169
- * Parameria polyneura Hook.f.

Parsonsia stenocarpa King & Gamble - Maxwell 80-208 (28 Nov 1980)

- * Tabernaemontana corymbosa Roxb.
- * Urceola torulosa Hook.f.
- * Urnularia flavescens (Dyer ex Hook.f.) Stapf
- * Willinghbeia coriacea Wall. NRS0048

Aquifoliaceae

- * Ilex cymosa Blume Ridley s.n. (23 Sep 1890)
- * Ilex macrophylla Hook.f.

Araceae

- † Aglaonema nebulosum N.E.Br. NRS0161
- *† Aglaonema nitidum (Jack) Kunth NRS0766 Aglaonema simplex Blume - NRS0868
- *† Alocasia denudata Engl. Ridley s.n. (30 Oct 1889)
- * Anadendrum montanum (Blume) Schott NRS2418
- † Cryptocoryne griffithii Schott NRS1525
- † Cyrtosperma merkusii (Hassk.) Schott NRS0889 Homalomena griffithii (Schott) Hook.f. - Ridley s.n. (May 1889)
- * Homalomena sagittifolia Jungh. ex Schott NRS2419
- * Pothos latifolius Hook.f.

Rhaphidophora korthalsii Schott - NRS1591

Rhaphidophora sylvestris (Blume) Engl. var. montana (Blume) Nicols. - NRS0992

Schismatoglottis wallichii (Roxb.) Hook.f. - NRS1604

Scindapsus hederaceus (Zoll. & Moritzi) Miq. - NRS1509

Araliaceae

- * Arthrophyllum diversifolium Blume (Arthrophyllum ovalifolium)
- * Schefflera cephalotes (C.B. Clarke) Harms

Asclepiadaceae

- * Dischidia albiflora Griff. (Dischidia collyris)
- * Dischidia complex Griff.
- * Dischidia hirsuta (Blume) Decne.
- * Dischidia major (Vahl) Merr. (Dischidia rafflesiana)
- * Dischidia nummularia R.Br.
- * Toxocarpus griffithii Decne. (Toxocarpus glabrescens)

Bignoniaceae

* Deplanchea bancana (Scheff.) Steenis

Bombacaceae

- * Coelostegia griffithii Benth.
- * Durio singaporensis Ridl.
- * Neesia malayana Bakh. Ridley 3770 (1892) Neesia synandra Mast. - NRS0996

Burseraceae

Canarium littorale Blume - Ridley 44 (Nov 1889)

- * Canarium odontophyllum Miq. Corner's specimen (s.n. 25 Apr 1934) taken from a 12 foot sapling is the only record of this species from the Malay Peninsula.
- * Canarium pilosum Benn.
- * Dacryodes incrvata (Engl.) H.J. Lam
- * Dacryodes rostrata (Blume) Lam
- * Santiria apiculata Benn.
- * Santiria griffithii (Hook.f.) Engl.
- * Santiria laevigata Blume
- *† Santiria rubiginosa Blume
- † Triomma malaccensis Hook.f.

Caprifoliaceae

Viburnum sambucinum Blume - Ridley 6829

Cecropiaceae

Poikilospermum suaveolens (Blume) Merr. - NRS1020 CCA 18

Celastraceae

- *† Bhesa paniculata Arn. NRS0170
- † Bhesa robusta (Roxb.) Ding Hou
- * Euonymus javanicus Blume
- *† Lophopetalum multinervium Ridl.
- † Lophopetalum wightianum Arn. Salacia grandiflora Kurz - NRS0128

Chrysobalanaceae

Auna racemosa Rafin. - Ridley 1898 (7 Dec 1890)

Liania splendens (Korth.) Prance - Ridley 4732 (15 Feb 1893)

- * Parastemon urophyllus (Wall. ex A. DC.) A. DC.
- * Parinari costata (Korth.) Blume
- * Parinari oblongifolia Hook.f.

Combretaceae

Combretum sundaicum Miq. - Mat 6783 (1985) Quisqualis indica L. - Ridley 8053 (1896)

* Terminalia phellocarpa King

Commelinaceae

† Amischotolype gracilis (Ridl.) I.M. Turner - NRS0179

Compositae

Vernonia arborea Buch.-Ham. - Goodenough 2739 (1891)

Connaraceae

- * Agelaea borneensis (Hook.f.) Merr. Maxwell 82-107 (28 May 1981)
- * Cnestis palala (Lour.) Merr.

Connarus ferrugineus Jack - Maxwell 83-26 (13 Mar 1983) Connarus grandis Jack - J. Sinclair SFN40321 (3 Jul 1954)

- * Connarus monocarpus L. ssp. malayanus Leenhouts
- * Connarus seniidecandrus Jack Rourea fulgens Planch. - NRS0860
- * Rourea minor (Gaertn.) Leenhouts

Convallariaceae

† Peliosanthes teta Andr. ssp. humilis (Andr.) Jessp. - NRS1169

Convolvulaceae

- * Argyreia ridleyi Prain ex Ooststr. NRS0001 CCA 13
- * Erycibe griffithii C.B. Clarke Erycibe tomentosa Blume var. tomentosa - NRS0181

Cornaceae

† Mastixia trichotoma Blume - Maxwell 82-258 (23 Jun 1982)

Cucurbitaceae

Trichosanthes celebica Cogn. - Maxwell 80-176 (31 July 1980)

Cyperaceae

Hypolytrum nemorum (Vahl) Spreng. - NRS1176

- † Mapania cuspidata (Miq.) Uittien NRS1620
- * Mapania enodis (Miq.) C.B. Clarke
- * Mapania lorea Uittien
- † Mapania squamata (Kurz) C.B. Clarke NRS1505
- * Thoracostachyum bancanum (Miq.) Kurz

Dilleniaceae

- * Acrotrema costata Jack no herbarium material of this species collected in Singapore can be found.
- * Dillenia grandifolia Wall. ex Hook.f & Thomson
- * Dillenia pulchella (Jack) Gilg
- * Tetracera akara (Burm.f.) Merr.
- * Tetracera arborescens Jack

Tetracera indica (Christm. & Panz.) Merr. - NRS0184

Dioscoreaceae

Dioscorea laurifolia Wall. ex Hook.f. - NRS0042 *Dioscorea polyclades* Hook.f. - Mat s.n. (15 May ?)

Dipterocarpaceae

- * Hopea mengerawan Miq. Goodenough 5094 (8 Apr 1893)
- * Shorea gratissima Dyer
- *† Shorea macroptera Dver
- † Shorea ovalis Blume (S. ?eximia)
- *† Shorea platycarpa Heim
- * Vatica pauciflora Blume (Vatica wallichii) Hill & Samsuri H3001 (22 Oct 1971)
- + Vatica ridleyana Brandis

Dracaenaceae

Dracaena aurantiaca Wall. - NRS0139

Dracaena elliptica Thunb. - Ridley s.n. (1894)

Dracaena singapurensis Ridl. - Ridley 6235 (1894)

Dracaena umbratica Ridl. - NRS1167

Ebenaceae

- * Diospyros coriacea Hiern
- *† Diospyros lanceifolia Roxb. Ridley 6695 (1894)
- *† Diospyros maingayi (Hiern) Bakh.
- *† *Diospyros pilosanthera* Blanco var. *oblonga* (Wall. ex G. Don) Ng (*Diospyros oblonga*) Hill & Samsuri H3025 (22 Oct 1971)
- * Diospyros siamang Bakh.

Diospyros sumatrana Mig. - Maxwell 82-73 (18 Mar 1982)

Elaeocarpaceae

Elaeocarpus acmosepalus Ridl. - Maxwell 83-25 (13 Mar 1983)

Elaeocarpus ferrugineus (Jack) Steud. - Goodenough 4948 (24 Feb 1890)

Elaeocarpus floribundus Blume - Sidek 605 (18 Mar 1982)

- * Elaeocarpus griffithii (Wight) A. Gray Ridley 418 (Nov 1889)
- * Elaeocarpus mastersii King Ridley 274 (Nov 1889)

Elaeocarpus nitidus Jack var. salicifolius (King) Ng - Samsuri Ahmad 1522 (17 Sept 1981)

- † Elaeocarpus petiolatus (Jack) Wall.
- * Elaeocarpus polystachyus Wall. Maxwell 81-214 (24 Sept 1981)

Elaeocarpus stipularis Blume - Maxwell 82-69 (18 Mar 1982)

Euphorbiaceae

* Agrostistachys longifolia (Wight) Benth. ex Hook.f. (Agrostistachys sessilifolia) - NRS018

* Alchornea villosa Müll.Arg.

Antidesma coriaceum Tul. - Maxwell 81-60 (1 Apr 1981)

Antidesma cuspidatum Müll.Arg. - NRS0856

Antidesma neurocarpum Miq. - NRS0116

Aporusa confusa Gage - NRS1359

Aporusa frutescens Blume - NRS0193

- † Aporusa penangensis (Ridl.) Airy Shaw
 - Aporusa symplocoides (Hook.f.) Gage NRS0876
- * Austrobuxus nitidus Miq.
- † Baccaurea hookeri Gage
- * Baccaurea kunstleri King ex Gage
- † Baccaurea minor Hook.f.
- † Baccaurea parviflora (Müll.Arg.) Müll.Arg.
- † Baccaurea racemosa (Reinw.) Müll.Arg.
- *† Blumeodendron tokbrai (Blume) Kurz
- * Bridelia griffithii Hook.f.
- * Croton laevifolius Blume NRS0872
- * Drypetes pendula Ridl.
- * Endospermum diadenum (Miq.) Airy Shaw
- * Glochidion hypoleucum (Miq.) Boerl. Maxwell 82-181 (1 Jul 1982)
- * Glochidion rubrum Blume
- * Glochidion sericeum (Blume) Zoll. & Moritzi Maxwell 82-53 (26 Feb 1982) Glochidion superbum Baill. - NRS0007
- * Hymenocardia sp. [the correct identity of this species has still not been determined]
- *† Macaranga conifera (Zoll.) Müll.Arg.
- * Macaranga gigantea (Rchb. f. & Zoll.) Müll.Arg.
- * Macaranga griffithiana Müll.Arg.
- * Macaranga hypoleuca (Rchb.f. & Zoll.) Müll.Arg.
- * Macaranga punticulata Gage
- * Macaranga recurvata Gage
- * Macaranga trichocarpa (Rchb.f. & Zoll.) Müll.Arg. Maxwell 81-81 (29 Apr 1981)
- *† Macaranga triloba (Reinw.) Müll.Arg. NRS0037
- † Neoscortechinia kingii (Hook.f.) Pax & K. Hoffm. NRS0771
- *† Pimelodendron griffithianum (Müll.Arg.) Benth.
- * Sapium discolor (Champ. ex Benth.) Müll.Arg.

Fagaceae

- * Castanopsis inermis (Linfl. ex Wall.) Benth. & Hook.f.
- † Castanopsis nephelioides King ex Hook.f. Castanopsis wallichii King ex Hook.f. - Ridley 3842 (Jun 1892)
- *† Lithocarpus bennettii (Miq.) Rehder E. Tang & Sidek 265 (12 Jan 1995)
- * Lithocarpus elegans (Blume) Hatus, ex Soepadmo
- † Lithocarpus sundaicus (Blume) Rehder

Flacourtiaceae

Casearia capitellata Blume - Ridley s.n. (1892)

- * Casearia lobbiana Turcz. Ridley s.n. (1894)
- * Casearia sp. the specimen cited by Corner (SFN32517) is Campnosperma squamatum, presumably the wrong number was referred to.
- * Flacourtia rukam Zoll. & Moritzi NRS1015

- * Osmelia maingavi King
- † Osmelia philippina (Turcz.) Benth. Maxwell 83-18 (17 Feb 1983)

Flagellariaceae

* Flagellaria indica L. - NRS0015

Gesneriaceae

Aeschynanthus albidus (Blume) Steud. (= A. purpurascens Hassk.) - NRS1012

- * Aeschynanthus parvifolius R.Br.
- * Aeschynanthus wallichii R.Br.

Gonystylaceae

- * Gonystylus confusus Airy Shaw
- † Gonystylus maingayi Hook.f.

Gramineae

* Leptaspis urceolata (Roxb.) R.Br. - NRS0039 Lophatherum gracile Brongn. - Goodenough 1701 (8 Feb 1890)

Guttiferae

- † Calophyllum dispar P.F. Stevens
- * Calophyllum ferrugineum Ridl. (Calophyllum retusum)
- * Calophyllum rubiginosum M.R. Hend. & Wyatt-Sm. (C. wallichianum)
- *† Calophyllum tetrapterum Miq. (Calophyllum floribundum)
- *† Calophyllum teysmannii Miq. (Calophyllum inophylloide var. singapurense)
- * Calophyllum wallichianum Planch. & Triana var. incrassatum (M.R. Hend. & Wyatt-Sm.) P.F. Stevens (Calophyllum incrassatum)
- * Cratoxylum arborescens (Vahl) Blume
- * Cratoxylum cochinchinense (Lour.) Blume (Cratoxylum ligustrinum) NRS0172
- * Cratoxylum formosum (Jack) Dyer
- † Garcinia eugeniifolia Wall. ex T. Anderson Ridley s.n. (1893)
- *† Garcinia forbesii King NRS0887 Garcinia griffithii T. Anderson - DJM101
- ? Garcinia hombroniana Pierre Ridley s.n. (1893) Garcinia mangostana L. - Ridley s.n. (1892)
- † Garcinia nervosa Miq. J. Sinclair SFN10915 (6 Sep 1966)
- * Garcinia nigrolineata Planch. ex T. Anderson
- *† Garcinia parvifolia (Miq.) Miq. Ridley s.n. (Nov 1909)
- * Garcinia scortechinii King (Garcinia gaudichaudii)

Hanguanaceae

* Hanguana malayana (Jack) Merr. - NRS0035

Hypoxidaceae

Curculigo latifolia Dryand. - NRS0025 CCA 13

Icacinaceae

* Cantleya corniculata (Becc.) Howard

Gomphandra quadrifida (Blume) Sleumer var. ovalifolia (Ridl.) Sleumer - NRS0777

Lodes cirrhosa Turcz - NRS0026

Iodes ovalis Blume - NRS0004

- * Phytocrene bracteata Wall.
- * Phytocrene latifolia Blume
- *† Stemonurus scorpioides Becc. Ridley s.n. (1892)

Irvingiaceae

* Irvingia malayana Oliv.

Ixonanthaceae

Ixonanthes icosandra Jack - Ridley 1937 (1890) Ixonanthes reticulata Jack - NRS0783

Lauraceae

- * Actinodaphne macrophylla (Blume) Nees
- † Alseodaphne bancana Miq. Samsuri 1401 (9 Feb 1977)
- * † Beilschmiedia kunstleri Gamble
- † Cryptocarya ferrea Blume NRS1005
- * Cryptocarya griffithiana Wight
- * Endiandra maingayi Hook.f. (Hexapora? curtisii)
- * Lindera lucida (Blume) Boerl. (Lindera malaccensis) Sinclair SFN40520 (22 Dec 1954) Litsea elliptica Blume - Samsuri 1446 (9 Feb 1977)
- † Litsea erectinervia Kosterm.
- * Litsea ferruginea Blume
- * Litsea firma Hook.f.
- * Litsea gracilipes Hook.f. Sinclair SFN40274 (1 May 1954)
- * Litsea grandis Hook.f. Ridley 3962 (1892)

Litsea lancifolia (Roxb.) Hook.f. - Maxwell 82-78 (19 Mar 1982)

Litsea ridlevi Gamble - NRS1183

- † Litsea robusta Blume
- † Phoebe grandis Merr.

Leeaceae

Leea indica (Burm.f.) Merr. - NRS0046

Leguminosae

- * Albizia splendens Miq. (Pithecellobium confertum)
 Archidendron clypearia (Jack) 1.C. Nielsen NRS0421
- * * Archidendron ellipticum (Blume) I.C. Nielsen (Pithecellobium ellipticum) Maxwell 81-146 (18 Jun 1981)

Archidendron microcarpum (Benth.) 1.C. Nielsen - Samsuri Ahmad 1399 (9 Feb 1977) Bauhinia semibifida Roxb. - NRS0990

- * Crudia caudata Prain [we have not been able to trace the specimen referred to by Corner]
- * Dalbergia havilandii Prain

Dalbergia pseudosissoo Miq. - J. Sinclair SFN39999 (2 Aug 1953)

Derris amoena Benth, var. maingavana (Baker) Prain - NRS0118 CCA 18

Derris trifoliata Lour. - Goodenough s.n. (30 Oct 1889)

- * Dialium patens Baker
 - Entada spiralis Ridl. Samsuri Ahmad 1451 (8 Mar 1977)
- * Koompassia malaccensis Maingay ex Benth.
- * Kunstleria ridlevi Prain

- * Milletia eriantha Benth. (Adinobotrys eriantha)
- * Ormosia macrodisca Baker
- * Parkia speciosa Hassk. Ridley 419 (Nov 1889) Saraca thaipingensis Cantley - NRS0779
- * Sindora wallichii Grah. ex Benth. Spatholobus ridleyi Prain ex King - Mat 6795 (1894)

Linaceae

* Indorouchera griffithiana (Planch.) Hallier f. - NRS0155

Loganiaceae

- * Fagraea auriculata Jack
- * Fagraea racemosa Jack ex Wall. NRS1027

Loranthaceae

Macrosolen cochinchinensis (Lour.) Tiegh. - Maxwell 82-257 (23 Sept 1982)

Magnoliaceae

*† Magnolia candollii (Blume) H. Keng var. singapurensis (Ridl.) Nooteboom (*Talauma singapurensis*, *T. lanuginosa*) - Maxwell 81-145 (18 Jun 1981)

Malpighiaceae

Aspidopteris concava (Wall.) Juss. - Maxwell 82-46 (17 Feb 1982)

Melastomataceae

Clidemia hirta (L.) D. Don. - NRS0043

- * Diplectria viminalis (Jack) Kuntze (Anplectrum viminale)
- * Macrolenes echinulata (Naud.) Bakh.f. (Marumia rhodocarpa)
- Medinilla crassifolia (Reinw. ex Blume) Blume (?Medinilla rubicunda var. hasseltii) Ridley 273 (Oct 1889)
- † Memecylon edule Roxb.
- * Memecylon floridum Ridl. (Memecylon sp.)
- † Memecylon lilacinum Zoll. & Moritzi
- * Pachycentria constricta (Blume) Blume (Pachycentria tuberculata)
- *† Pternandra coerulescens Jack NRS0754
- * Pternandra echinata Jack NRS0192 Sonerila heterostemon Naud. - NRS0778

Meliaceae

- † Aglaia odoratissima Blume Maxwell 82-282 (4 Nov 1982)
 - Aglaia oligophylla Miq. Ridley 3919 (1892)
- *† Aglaia rubiginosa (Hiern) Pannell Ridley 3790 (1892)
- * Aphananixis polystachya (Wall.) Parker Maxwell 82-282 (2 Jul 1981)

Dysoxylum cauliflorum Hiern. - Goodenough 5080 (1893)

Dysoxylum cyrtobotryum Miq. - Goodenough s.n. (Mar 1890)

- † Dysoxylum densiflorum (Blume) Miq.
- † Dysoxylum excelsum Blume Goodenough s.n. (15 Mar 1890) Dysoxylum flavescens Hiern - J. Sinclair SFN40262 (23 Apr 1954)
- † Lansium domesticum Correa

Pseudoclausena chrysogyne (Miq.) T.P. Clark - Maxwell 81-199 (13 Aug 1981)

*† Sandoricum beccarianum Baill. (Sandoricum emarginatum)

Menispermaceae

Fibraurea tinctoria Lour. - NRS0143 Limacia scandens Lour. - NRS0147 Stephania capitata (Blume) Spreng. - NRS0159 Tinospora macrocarpa Diels - NRS0849

Monimiaceae

† Kibara coriacea (Blume) Tul. Matthaea sancta Blume - NRS1003

Moraceae

- * Artocarpus elasticus Reinw. ex Blume Chew CWL34 (5 Mar 1957) Artocarpus fulvicortex Jarrett - Ridley 4129 (1892)
- *† Artocarpus kemando Miq. Sinclair SFN40322 (3 Jul 1954)
- * Artocarpus nitidus Tréc. ssp. griffithii (King) Jarrett
- * Artocarpus scortechinii King
- * Ficus albipila (Miq.) King
- * Ficus apiocarpa Miq. NRS2128
- * Ficus binnendykii Miq. var. coriacea Corner
- * Ficus bracteata Wall. ex Mig.
- * Ficus consociata Blume var. murtoni King E. Tang & Sidek 785 (10 Jul 1995)
- * Ficus excavata King
- * Ficus fistulosa Reinw. ex Blume var. fistulosa NRS0010
- * Ficus globosa Blume NRS0183

Ficus heteropleura Blume - NRS1180

- * Ficus nucrocarpa L.f.
- * Ficus microsyce Ridl.
- * Ficus obscura Blume var. borneensis (Mig.) Corner
- * Ficus pellucido-punctata Griff.

Ficus pisocarpa Blume - DJM318

- * Ficus recurva Blume var. ribesioides King
- * Ficus retusa L.
- * Ficus ruginervia L.
- * Ficus sagittata Vahl -

Ficus scortechinii King - NRS1174

Ficus sinuata Thunb. - NRS0186

- * Ficus sundaica Blume NRS0014
- * Ficus trichocarpa Blume DJM171

Ficus variegata Blume - Ridley s.n. (189?)

* Ficus villosa Blume - NRS1618

Ficus virens Ait. var. glabella (Blume) Corner - Ridley 1602 (30 Oct 1889)

* Ficus xylophylla Wall. ex Miq.

Parartocarpus bracteatus (King) Becc. - Ridley 4128 (1892)

- * Parartocarpus venenosus (Zoll. & Moritzi) Becc. ssp. forbesii (King) Jarrett
- * Streblus elongatus (Miq.) Corner

Myristicaceae

* Endocomia canarioides (King) W.J. de Wilde (Horsfieldia macrocoma var. canarioides)

- *† Gymnacranthera bancana (Miq.) J. Sinclair
- *† Gymnacranthera farquhariana (Hook.f. & Thomson) Warb. (Gymnancranthera eugeniifolia var. griffithii) Ridley 1834 (9 Dec 1891)

 Gymnacranthera forbesii (King) Warb. NRS1190
- *† Horsfieldia crassifolia (Hook.f. & Thomson) Warb. Ridley 8040 (Feb 1896)
- * Horsfieldia grandis (Hook.f.) Warb.
- *† Horsfieldia polyspherula (Hook.f.) J. Sinclair (Horsfieldia subglobosa)
- *† Horsfieldia sucosa (King) Warb. (Horsfieldia bracteosa)
- * Horsfieldia superba (Hook.f. & Thomson) Warb.
- † Horsfieldia wallichii (Hook.f. & Thomson) Warb. Ridley 5061 (1893)
- † Knema communis J. Sinclair Ridley 1833
- *† Knema conferta (King) Warb.
- *† Knema curtisii (King) Warb. var. paludosa J. Sinclair
- * Knema glaucescens Jack
- † Knema hookeriana (Wall. ex Hook.f. & Thomson) Warb.
- * Knema intermedia (Blume) Warb.
- † Knema latericia Elm. NRS0869
- † Knema laurina (Blume) Warb.
- *† Knema malayana Warb. Maxwell 81-87 (29 Apr 1981)
- *† Myristica cinnamomea King Sinclair SFN40374 (25 Sep 1954)
- *† Myristica elliptica Wall. ex Hook. f. & Thomson NRS0049
- *† Myristica iners Blume
- *† Myristica lowiana King Myristica maxima Warb. - Sinclair SFN 40304 (22 May 1954)

Myrsinaceae

† Ardisia colorata Roxb. - NRS0018

Ardisia miqueliana Scheff. - NRS0767

Ardisia sessilis Scheff. - Ridley 3844 (Jun 1892)

Ardisia tevsmanniana Scheff. - Maxwell 82-147 (23 Apr 1982)

* Ardisia tuberculata Wall. ex A.DC.

Ardisia villosa Roxb. - NRS0883

Embelia canescens Jack - NRS0947

- * Embelia coriacea Wall. ex A. DC.
- * Embelia fulva Mez (E. ?amentacea) Labisia pumila (Blume) Fern.-Vill. - NRS1186
- * Maesa ramentacea Wall. ex Roxb. Maxwell 81-240 (3 Dec 1981)

Myrtaceae

- * Aphanomyrtus rostrata Miq. (Pseudoeugenia singaporensis) NRS0878
- * Decaspermum fruticosum J.R. Forst. & G. Forst DJM174
- *† Eugenia cerina M.R. Hend. Samsuri Ahmad 1396 (9 Feb 1977) Eugenia chlorantha Duthie - Ridley 3910
- * Eugenia cumingiana Vidal

 $\label{thm:eq:loss} \textit{Eugenia filiformis} \ \mathsf{Duthie} \ \mathsf{var.} \ \textit{clavimyrtus} \ (\mathsf{Koord.} \ \& \ \mathsf{Valeton}) \ \mathsf{M.R.} \ \mathsf{Hend.}$

Eugenia grandis Wight - Maxwell 81-103 (28 May 1981)

- * Eugenia kunstleri King
 - Eugenia leptostemon (Korth.) Miq. Mat s.n. (5 May 1895)
- * Eugenia longiflora (Presl) Fern.-Vill.
- * Eugenia microcalyx Duthie

- * Eugenia muelleri Miq.
- * Eugenia nemestrina M.R. Hend. Corner SFN37396 (28 Dec 1940)

 Eugenia oblongifolia Duthie Ridley 360 (Nov 1889)
- * Eugenia oleina Wight
- * Eugenia pachyphylla Kurz NRS0138
- *† Eugenia papillosa Duthie

Eugenia polyantha Wight - NRS0562

* Eugenia pseudocrenulata M.R. Hend.

Eugenia pseudosubtilis King - Goodenough 4487 (21 Dec 1889)

Eugenia pustulata Duthie - Mat 6806 (15 May 1895)

Eugenia ridlevi King - Mat 6805 (15 May 1895)

- * Eugenia rugosa (Korth.) Merr.
- * Eugenia tumida Duthie Maxwell 81-210 (24 Sep 1981)

 Rhodamnia cinerea Jack Goodenough s.n. (10 Feb 1890)
- † Tristaniopsis merguensis (Griff.) Peter G. Wilson & J.T. Waterh.

Najadaceae

Najas indica (Willd.) Cham. - NRS0838

Nepenthaceae

- * Nepenthes ampullaria Jack
- * Nepenthes gracilis Korth.
- * Nepenthes rafflesiana Jack

Nymphaeaceae

* Barclaya motleyi Hook.f. - Sinclair SFN40337 (17 July 1954)

Ochnaceae

* Brackenridgea hookeri (Planch.) A. Gray Brackenridgea palustris Bartell. - Ridley 5896 (1894)

Olacaceae

Erythropalum scandens Blume - NRS0845

- † Ochanostachys amentacea Mast.
- *† Strombosia ceylanica Gardn. NRS1946

Oleaceae

* Chionanthus ramiflorus Roxb. (Linociera pauciflora)

Jasminum aemulum R.Br. - Mohd. Shah & Ali MS4153 (3 Dec 1981)

Orchidaceae

- * Agrostophyllum bicuspidatum J.J.Sm.
- * Anoectochilus geniculatus Ridl. Ridley 5896 (1894)
- * Appendicula lucida Ridl.
- * Biermannia laciniata (Carr) Garay (Chamaeanthus laciniatus)
- * Bulbophyllum acuminatum (Ridl.) Ridl.
- * Bulbophyllum apodum Hook.f. Ridley 3933 (1892) Bulbophyllum blumei (Lindl.) J.J.Sm. - Mat s.n. (1894)
- * Bulbophyllum botryophorum Ridl. Bulbophyllum gusdorfii J.J.Sm. - NRS1683

Bulbophyllum macranthum Lindl. - NRS1320

Bulbophyllum medusae (Lindl.) Rchb.f. - Goodenough s.n. (1891)

Bulbophyllum ovalifolium (Blume) Lindl. - Mat s.n. (1894)

- * Bulbophyllum pileatum Lindl.
- * Bulbophyllum pulchellum Ridl. Ridley s.n. (19 Dec 1890)
- * Bulbophyllum purpurascens Teijsm. & Binnend.
- * Bulbophyllum sessile (Koenig) J.J.Sm. Ridley s.n. (1892)
- * Bulbophyllum vaginatum (Lindl.) Rchb.f.
- * Calanthe pulchra (Blume) Lindl. Chew & Whitmore s.n. (5 Mar 1957)
- * Ceratostylis subulata Blume (Camerotis adnata)
- * Claderia viridiflora Hook.f. NRS0002

Coelogyne mayeriana Rchb.f. - Ridley s.n. (1891)

Corymborkis veratrifolia (Rienw.) Blume - Mat 6756 (1894)

Cymbidium finlaysonianum Lidl. - Ridley s.n. (1891)

Cystorchis variegata Blume - Sinclair SFN40277 (8 May 1954)

- * Dendrobium aloifolium (Blume) Rchb.f.
- * Dendrobium concinnum Miq. (Dendrobium carnosum) Ridley s.n. (1892)
- * Dendrobium crumenatum Sw.

Dendrobium indivisum (Blume) Mig. - Ridley s.n. (1892)

- * Dendrobium leonis (Lindl.) Rchb.f. Ridley s.n. (30 Oct 1889) Dendrobium planibulbe Lindl. - Goodenough s.n. (29 Aug 1890)
- * Dendrobium prostratum Ridl.

Dendrobium pulchellum Roxb. ex Lindl. - Ridley s.n. (May/Jun 1890)

Dendrobium setifolium Ridl. - Goodenough s.n. (21 Dec 1889)

Dendrobium spegidoglossum Rchb.f. - Ridley s.n. (1894)

- * Dendrobium spurium (Blume) J.J.Sm.
- * Dendrochilum longifolium Rchb.f.

Didymoplexis pallens Griff. - Ridley s.n. (1889)

Eria bractescens Lindl. - Ridley s.n. (1890)

- * Eria floribunda Lindl. Goodenough s.n. (13 Jan 1892)
- * Eria neglecta Ridl.
- * Eria nutans Lindl.
- * Eria pannea Lindl. Goodenough s.n. (1891)

Eria pulchella Lindl. - Ridley s.n. (1892)

- * Eulophia spectabilis (Dennst.) Suresh (Eulophia squalida) Ridley s.n. (1892)
- * Flickingeria comata (Blume) Hawkes (Dendrobium comatum)
- * Flickingeria fimbriata (Blume) Hawkes (Dendrobium plicatile)
- * Galeola nudifolia Lour. (Galeola kuhlii) Ridley 4037 (28 Oct 1892)
- * Hylophila mollis Lindl. Ridley s.n. (Oct 1889)
- † Lecanorchis malaccensis Ridl. NRS1533
- * Lipparis gibbosa Finet Goodenough s.n. (1891)

Lipparis tricallosa Rchb.f. - Goodenough s.n. (13 Jan 1892)

* Lipparis wrayi Hook.f.

Malaxis latifolia J.E.Sm. - Ridley 3922 (1892)

Malaxis micrantha (Hook.f.) Kuntze - Ridley s.n.

Microsaccus javensis Blume - Ridley s.n. (1894)

Nephelaphyllum pulchrum Blume - NRS0775

* Nervilia punctata (Blume) Makino

Oberonia stenophylla Ridl. - Corner 393 (Dec 1930)

Plocoglottis gigantea (Hook.f.) J.J.Sm. - NRS0122

*† Plocoglottis javanica Blume - NRS0999

Podochilus microphyllus Lindl. - Goodenough s.n. (15 Oct 1889)

Pteroceras pallidum (Ridl.) Holttum - NRS1935

- * Schoenorchis secundiflora (Ridl.) J.J.Sm.
- * Taeniophyllum filiforme J.J.Sm.
- * Taeniophyllum obtusum Blume NRS1318
- * Thelasis micrantha (Brongn.) J.J.Sm.
- * Thelasis pygmaea (Griff.) Lindl. (Thelasis triptera)
 Thrixspermum trichoglottis (Hook.f.) Kuntze NRS1319
- * Trichotosia velutina (Lodd. ex Lindl.) Kraenzl. (Eria velutina) Vrydagzynea lancifolia Ridl. - Ridley s.n. (Jan 1890)

Oxalidaceae

- * Dapania racemosa Korth.
- † Sarcotheca griffithii (Planch. ex Hook.f.) Hallier f.

Palmae

Calanus ridlevanus Becc. - Hill & Samsuri 3108 (22 Oct 1971)

* Cyrtostachys renda Blume (Cyrtostachys lakka)

Daemonorops angustifolia (Griff.) Mart.- NRS0031

Daemonorops didymophylla Becc. - Ridley 3476 (1892)

Daemonorops hystrix (Griff.) Mart. - Ridley s.n.

Daemonorops kunstleri Becc. - Goodenough 1667 (21 Jun 1890)

* Daemonorops leptopus (Griff.) Mart.

Daemonorops longipes (Griff.) Mart. - NRS2424

Daemonorops sabut Becc. - Sinclair SFN40303 (22 May 1954)

Eleiodoxa conferta (Griff.) Burret (Salacca conferta) - Ridley 3502 (1892)

Iguanura wallichiana (Wall. ex Mart.) Hook.f. - NRS0177

Korthalsia echinometra Becc. - NRS1175

Licuala ferruginea Becc. - NRS1177

Myrialepis paradoxa (Kurz) J. Dransf. - Ridley 3503 (1892)

- * Nenga pumila (Mart.) Wendl. Ridley s.n. (1900)
- * Onchosperma horridum (Griff.) Scheff. Ridley s.n. (1891)

Orania sylvicola (Griff.) H.E. Moore - Ridley 3144 (1891)

Pinanga malaiana (Mart.) Scheff. - NRS0135

Rhopaloblaste singaporensis (Becc.) Hook.f. - Ridley 2134 (1891)

Pandaceae

* Galearia fulva (Tul.) Mig. - NRS0881

Pandanaceae

- * Freycinetia angustifolia Blume Samsuri 1451 (8 Mar 1977)
- * Freycinetia confusa Ridl.
- * Freycinetia corneri B.C. Stone
- * Frecinetia javanica Blume NRS1527
- * Pandanus atrocarpus Griff.
- * Pandanus kamiae B.C. Stone

Passifloraceae

Adenia macrophylla (Blume) Koord. var. *singaporeanna* (Wall. ex G. Don) W.J. de Wilde -NRS1028 CCA 18

Phormiaceae

* Dianella ensifolia (L.) DC. - NRS0281 CCA 18

Piperaceae

- * Piper flavimarginatum C. DC.
- * Piper miniatum Blume Piper muricatum Blume - NRS1187

Polygalaceae

- *† Xanthophyllum affine Korth. NRS0995
- † Xanthophyllum ellipticum Korth.
- † Xanthophyllum obscurum Benn.
- † Xanthophyllum vitellinum (Blume) Dietr.

Rhamnaceae

Ventilago malaccensis (Lour.) Merr. - Maxwell 81-64 (1 Apr 1981)

* Ziziphus elegans Wall.

Rhizophoraceae

- *† Carallia brachiata (Lour.) Merr. Maxwell 81-102 (28 May 1981)
- *† Gynotroches axillaris Blume Sidek & Ali SK620 (9 Dec 1982)
- *† Pellacalyx axillaris Korth. NRS0146

Rosaceae

- * Prunus arborea (Blume) Kalkman
- * Prunus grisea (C. Muell.) Kalkman
- † Prunus polystachya (Hook f.) Kalkman NRS0191

Rubiaceae

- * Aidia corymbosa (Blume) K.M. Wong (Randia auriculata) Aidia wallichiana Tirveng. - Ridley 5662 (1892)
- * Caelospermum truncatum (Wall.) Baill. ex K. Schum. Canthium horridum Blume - NRS0044

Cantinuam norriaum Blume - NKS0044

Chasalia chartacea Craib - NRS1025

Coptosapelta griffithii Hook.f. - Mat 6891 (1895)

† Diplospora malaccensis Hook.f. - NRS0763

Gardenia griffithii Hook.f. - Hullett 611 (21 Aug 1888)

Gynochthodes sublanceolata Miq. - Samsuri Ahmad 1521 (17 Sep 1981)

Hedvotis capitellata Wall. ex G. Don - DJM166

Hedyotis congesta R.Br. ex G. Don - DJM139

* Hydnophytum formicarum Jack Ixora coccinea Hook.f. - Mat 6714 (1894)

* Ixora congesta Roxb.

Ixora lobbii King & Gamble - NRS2410

Ixora pendula Jack - Ridley 5676

*† Jackiopsis ornata (Wall.) Ridsdale (Jackia ornata)

Lasianthus appressus Hook.f. or L. attenuatus Jack - NRS0998

Lasianthus attenuatus Jack - NRS0023

Lasianthus constrictus Wight - NRS0034

Lasianthus densifolius Mig. - NRS0756

* Lasianthus griffithii Wight - NRS1949

Lasianthus ridleyi King & Gamble - Maxwell 82-100 (7 Apr 1982)

* Lecananthus erubescens Jack

Lucinaea membranaea King - NRS0862

Morinda citrifolia L. - NRS0167

- * Morinda ridleyi (King & Gamble) Ridl. Maxwell 81-235 (3 Dec 1981)
- * Morinda rigida Miq.

Morinda umbellata L. - NRS2411

Mussaenda glabra Vahl - NRS0047

- *† Mussaendopsis beccariana Baill. NRS0991
- * Myrmecodia tuberosa Jack
- † Ophiorrhiza singaporensis Ridl. NRS0165
- * Oxyceros scandens (Blume) Tirveng. (Randia clarkei)
- * Pavetta wallichiana Steud. (Pavetta indica) NRS0759

Porterandia anisophylla (Jack ex Roxb.) Ridl. - NRS0852

Prismatomeris glabra (Korth.) Valeton - Ridley 6150 (Apr 1894)

Psychotria sp. 9 - Hullett s.n. (1896)

- * Psychotria maingayi Hook.f.
- * Psychotria obovata Wall.

Psychotria penangensis Hook.f. - NRS0770

Psychotria sarmentosa Blume - NRS0173

- * Rothmannia macrophylla (R.Br. ex Hook.f.) Bremek. (Randia macrophylla)
- * Tarenna adpressa (King) Merr.

Tarenna odorata (Roxb.) B.L. Rob. - NRS0871

- * Timonius flavescens (Jack) Baker Maxwell 81-82 (29 Apr 1981)
- * Timonius wallichianus (Korth.) Valeton NRS0857
- * Uncaria acida (Hunter) Roxb. (Uncaria ovalifolia)

Uncaria cordata (Lour.) Merr. - DJM172

Uncaria gambir (Hunter) Roxb. - Maxwell 82-50 (17 Feb 1982)

Uncaria lanosa Wall. var. glabrata (Blume) Ridsdale

Uncaria longiflora (Poir.) Merr. var. pteropoda (Miq.) Ridsdale - Ridley s.n.

Urophyllum blumeanum (Wight) Hook.f. - NRS0752

- * Urophyllum glabrum Wall. NRS0162
 - Urophyllum sp. 2 of Wong (Tree Flora of Malaya Vol. 4) NRS0176
- * Urophyllum streptopodium Wall. ex Hook.f.

Rutaceae

Glycosmis chlorosperma (Blume) Spreng. - Ridley 3912 (1892)

Luvunga crassifolia Tanaka - NRS0635

Maclurodendron porteri (Hook.f.) T.G. Hartley - Hill & Samsuri H3017 (22 Oct 1971)

Sapindaceae

* Lepisanthes fruticosa (Roxb.) Leenh.

Nephelium cuspidatum Blume var. eriopetalum (Miq.) Leenh.

- * Nephelium lappaceum L. (N. glabrum) NRS0006
- * Nephelium laurinum Blume Ridley 6211 (Apr 1894)
- *† Pometia pinnata Forst. Sinclair SFN40519 (22 Dec 1954)

Xerospermun noronhianum Blume - Ridley s.n. (1894)

Sapotaceae

- *† Ganua motleyana (de Vr.) Pierre ex Dubard Madhuca malaccensis (C.B. Clarke) Lam - Mat 6500 (1894)
- * Palaquium hexandrum (Griff.) Baill. Palaquium gutta (Hook.f.) Baill. - Hill & Samsuri H3038 (22 Oct 1971)
- *† Palaquium rostratum (Miq.) Burck
- *† Palaquium xanthochymum (de Vr.) Pierre Ridley 3774 (1892)
- * Planchonella maingayi (C.B. Clarke) van Royen

Smilacaceae

Smilax setosa Miq. - NRS0129 Smilax calophylla Wall. - NRS0997

Sterculiaceae

Byttneria maingayi Mast. - Maxwell 82-59 (26 Feb 1982) Commersonia bartramia (L.) Merr. - NRS1018

* Heritiera elata Ridl.

Scaphium linearicarpum (Mast.) Pierre - Himat (?) s.n. (11 Oct 1956)

- † Scaphium macropodum (Miq.) Beumee ex Heyne
- * Sterculia coccinea Jack NRS0121
- † Sterculia cordata Blume
- * Sterculia gilva Miq. (Stercula bicolor)
- *† Sterculia macrophylla Vent. Samsuri Ahmad 1455 (8 Mar 1977)
- *† Sterculia rubiginosa Vent. Samsuri Ahmad 1395 (9 Feb 1977)

Symplocaceae

- * Symplocos barringtoniifolia Brand Maxwell 82-180 (1 July 1982)
- † Symplocos fasciculata Zoll.

Taccaceae

* Tacca integrifolia Ker-Gawl. - Goodenough s.n. (14 Apr 1890)

Theaceae

Adinandra acuminata Korth. - Ridley s.n. (1894) Adinandra dumosa Jack - NRS0198

† Eurya acuminata DC. - NRS0052 Gordonia penangensis Ridl. - Ridley 3913 (1892)

† Pyrenaria acuminata Planch. ex Choisy - NRS1016

Thymelaeaceae

*† Aquilaria malaccensis Lam. Enkleia malaccensis Griff. - DJM153

Tiliaceae

- * Grewia acuminata Juss. (Grewia umbellata) NRS0185
- *† Microcos blattifolia (Corner) Rao (Grewia blattifolia)
- *† Pentace triptera Mast.

Ulmaceae

* Gironniera parvifolia Planch.

Verbenaceae

- * Clerodendrum deflexum Wall. NRS 1009 Clerodendrum laevifolium Blume - NRS 0758 Clerodendrum paniculatum L. - NRS 0846
- * Clerodendrum villosum Blume NRS0005 Vitex pinnata L. - NRS0136

Viscaceae

Viscum articulatum Burm.f. - Ridley 8054 (1896) Viscum ovalifolium Wall. ex DC. - Ridley s.n. (1896)

Vitaceae

Ampelocissus elegans (Kurz) Gagnep. - NRS0011
Ampelocissus gracilis (Wall.) Planch. - NRS1170

- * Cayratia mollissima (Wall.) Gagnep. (Vitis mollissima) DJM1696
- * Cissus hastata (Miq.) Planch. (Vitis hastata) NRS0187
- * Cissus nodosa Blume (Vitis glaberrima) Ridley 6789 (7 Aug 1895) Cissus repens Lam. - NRS0884 Pterisanthes eriopoda (Miq.) Planch. - Ridley 425 (Nov 1889)
- * Pterisanthes polita (Miq.) Laws. NRS0127

Zingiberaceae

- * Amonum hastilabium Ridl.
- * Amomum xanthophlebium Baker Ridley s.n. (1899)

 Etlingera punicea (Roxb.) R.M. Sm. Maxwell 81-101 (28 May 1981)

 Globba leucantha Miq. Betty Allen s.n. (28 May 1949)
- * Hornstedtia leonurus (Koenig) Retz. Ridley s.n. (1892)
- * Hornstedtia scyphifera (Koenig) Steud. -Plagiostachys lateralis (Ridl.) Ridl. - Ridley s.n. (1892) Zingiber griffithii Baker - NRS0787